

KTY83 series

Silicon temperature sensors

Rev. 06 — 4 April 2008 **Product data sheet**

1. Product profile

1.1 General description

The temperature sensors in the KTY83 series have a positive temperature coefficient of resistance and are suitable for use in measurement and control systems. The sensors are encapsulated in the SOD68 (DO-34) package.

Other special selections are available on request.

1.2 Features

- High accuracy and reliability
- Positive temperature coefficient; fail-safe behavior
- Long-term stability
- Virtually linear characteristics

1.3 Quick reference data

Table 1. Quick reference data

T_{amb} = 25 °C; in liquid; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
R_{25}	sensor resistance	$I_{sen(cont)}$ = 1 mA				
		KTY83/110	990	-	1010	Ω
		KTY83/120	980	-	1020	Ω
		KTY83/121	980	-	1000	Ω
		KTY83/122	1000	-	1020	Ω
		KTY83/150	950	-	1050	Ω
		KTY83/151	950	-	1000	Ω

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	cathode (k)	k a	k a 001aaa020
2	anode (a)		



3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
KTY83/110	-	hermetically sealed glass package; axial leaded; 2 leads	SOD68
KTY83/120			
KTY83/121			
KTY83/122			
KTY83/150			
KTY83/151			

4. Marking

Table 4. Marking codes

Type number	Marking code
KTY83/110	KT83A
KTY83/120	KT83C
KTY83/121	KT83D
KTY83/122	KT83E
KTY83/150	KT83H
KTY83/151	KT83K

5. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
$I_{sen(cont)}$	continuous sensor current	in free air; T_{amb} = 25 °C	-	10	mA
		in free air; T_{amb} = 175 °C	-	2	mA
T_{amb}	ambient temperature		–55	+175	°C

6. Characteristics

Table 6. Characteristics

T_{amb} = 25 °C; in liquid; unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
R_{25}	sensor resistance	$I_{sen(cont)}$ = 1 mA					
		KTY83/110		990	-	1010	Ω
		KTY83/120		980	-	1020	Ω
		KTY83/121		980	-	1000	Ω
		KTY83/122		1000	-	1020	Ω
		KTY83/150		950	-	1050	Ω
		KTY83/151		950	-	1000	Ω
TC	temperature coefficient			-	0.76	-	%/K
R_{100}/R_{25}	resistance ratio	T_{amb} = 100 °C and 25 °C		1.65	1.67	1.69	
R_{-55}/R_{25}	resistance ratio	T_{amb} = –55 °C and 25 °C		0.49	0.50	0.51	
ΔR_{25}	drift of sensor resistance at 25 °C	10000 h continuous operation; T_{amb} = 175 °C		-	1	-	Ω
τ_{th}	thermal time constant	in still air	[1]	-	20	-	s
		in still liquid	[1]	-	1	-	s
		in flowing liquid	[1]	-	0.5	-	s

[1] The thermal time constant is the time taken for the sensor to reach 63.2 % of the total temperature difference. For example, if a sensor with a temperature of 25 °C is moved to an environment with an ambient temperature of 100 °C, the time for the sensor to reach a temperature of 72.4 °C is the thermal time constant.

Table 7. Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY83/110 and KTY83/120

$I_{sen(cont)}$ = 1 mA.

Ambient temperature		Temperature coefficient (%/K)	KTY83/110				KTY83/120			
(°C)	(°F)		Resistance (Ω)			Temperature error (K)	Resistance (Ω)			Temperature error (K)
			Min	Typ	Max		Min	Typ	Max	
–55	–67	0.97	485	500	515	±3.08	480	500	520	±4.11
–50	–58	0.96	510	525	540	±2.99	504	525	545	±4.04
–40	–40	0.93	562	577	592	±2.81	556	577	598	±3.88
–30	–22	0.91	617	632	647	±2.62	611	632	654	±3.72
–20	–4	0.88	677	691	706	±2.42	670	691	713	±3.56
–10	14	0.85	740	754	768	±2.2	732	754	776	±3.37
0	32	0.83	807	820	833	±1.97	798	820	841	±3.18
10	50	0.80	877	889	902	±1.72	868	889	910	±2.97
20	68	0.78	951	962	973	±1.45	942	962	983	±2.74
25	77	0.76	990	1000	1010	±1.31	980	1000	1020	±2.62
30	86	0.75	1027	1039	1050	±1.44	1017	1039	1060	±2.77
40	104	0.73	1105	1118	1132	±1.7	1093	1118	1143	±3.07
50	122	0.71	1185	1202	1219	±1.98	1173	1202	1231	±3.39
60	140	0.69	1268	1288	1309	±2.27	1255	1288	1321	±3.73
70	158	0.67	1355	1379	1402	±2.58	1341	1379	1416	±4.08
80	176	0.65	1445	1472	1500	±2.9	1430	1472	1515	±4.44
90	194	0.63	1537	1569	1601	±3.24	1522	1569	1617	±4.82
100	212	0.61	1633	1670	1707	±3.59	1617	1670	1723	±5.22
110	230	0.60	1732	1774	1816	±3.95	1714	1774	1834	±5.63
120	248	0.58	1834	1882	1929	±4.34	1815	1882	1948	±6.06
125	257	0.57	1886	1937	1987	±4.53	1867	1937	2006	±6.28
130	266	0.57	1939	1993	2046	±4.73	1919	1993	2066	±6.5
140	284	0.55	2047	2107	2167	±5.14	2026	2107	2188	±6.96
150	302	0.54	2158	2225	2292	±5.57	2136	2225	2314	±7.43
160	320	0.52	2272	2346	2420	±6.02	2249	2346	2444	±7.92
170	338	0.51	2389	2471	2553	±6.47	2364	2471	2578	±8.43
175	347	0.51	2449	2535	2621	±6.71	2423	2535	2646	±8.68

Table 8. Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY83/121 and KTY83/122

$I_{sen(cont)}$ = 1 mA.

Ambient temperature		Temperature coefficient (%/K)	KTY83/121				KTY83/122			
(°C)	(°F)		Resistance (Ω)			Temperature error (K)	Resistance (Ω)			Temperature error (K)
			Min	Typ	Max		Min	Typ	Max	
–55	–67	0.97	480	495	510	±3.08	490	505	520	±3.08
–50	–58	0.96	505	519	534	±2.99	515	530	545	±2.99
–40	–40	0.93	556	571	586	±2.81	567	583	598	±2.81
–30	–22	0.91	611	626	641	±2.62	624	639	654	±2.62
–20	–4	0.88	670	685	699	±2.42	684	698	713	±2.42
–10	14	0.85	732	746	760	±2.2	747	762	776	±2.2
0	32	0.83	799	812	825	±1.97	815	828	842	±1.97
10	50	0.80	868	880	893	±1.72	886	898	911	±1.72
20	68	0.78	942	953	963	±1.45	961	972	983	±1.45
25	77	0.76	980	990	1000	±1.31	1000	1010	1020	±1.31
30	86	0.75	1017	1028	1039	±1.44	1038	1049	1060	±1.44
40	104	0.73	1094	1107	1121	±1.7	1116	1130	1144	±1.7
50	122	0.71	1173	1190	1206	±1.98	1197	1214	1231	±1.98
60	140	0.69	1256	1276	1295	±2.27	1281	1301	1322	±2.27
70	158	0.67	1341	1365	1388	±2.58	1368	1392	1416	±2.58
80	176	0.65	1430	1458	1485	±2.9	1459	1487	1515	±2.9
90	194	0.63	1522	1554	1585	±3.24	1553	1585	1617	±3.24
100	212	0.61	1617	1653	1690	±3.59	1650	1687	1724	±3.59
110	230	0.60	1715	1756	1798	±3.95	1750	1792	1834	±3.95
120	248	0.58	1816	1863	1910	±4.34	1853	1900	1948	±4.34
125	257	0.57	1867	1917	1967	±4.53	1905	1956	2007	±4.53
130	266	0.57	1920	1973	2025	±4.73	1959	2012	2066	±4.73
140	284	0.55	2027	2086	2145	±5.14	2068	2128	2188	±5.14
150	302	0.54	2137	2203	2269	±5.57	2180	2247	2314	±5.57
160	320	0.52	2249	2323	2396	±6.02	2295	2370	2444	±6.02
170	338	0.51	2365	2446	2527	±6.47	2413	2496	2578	±6.47
175	347	0.51	2424	2509	2595	±6.71	2473	2560	2647	±6.71

Table 9. Ambient temperature, corresponding resistance, temperature coefficient and maximum expected temperature error for KTY83/150 and KTY83/151

$I_{sen(cont)}$ = 1 mA.

Ambient temperature		Temperature coefficient (%/K)	KTY83/150				KTY83/151			
			Resistance (Ω)			Temperature error (K)	Resistance (Ω)			Temperature error (K)
(°C)	(°F)		Min	Typ	Max		Min	Typ	Max	
−55	−67	0.97	465	500	535	±7.19	466	487	509	±4.92
−50	−58	0.96	489	525	561	±7.16	489	512	534	±4.56
−40	−40	0.93	539	577	615	±7.1	539	562	586	±4.42
−30	−22	0.91	592	632	673	±7.04	593	617	641	±4.28
−20	−4	0.88	649	691	734	±6.97	650	674	699	±4.12
−10	14	0.85	710	754	798	±6.9	710	735	760	±3.96
0	32	0.83	774	820	866	±6.81	774	799	824	±3.79
10	50	0.80	842	889	937	±6.72	842	867	892	±3.59
20	68	0.78	913	962	1012	±6.61	914	938	963	±3.39
25	77	0.76	950	1000	1050	±6.55	950	975	1000	±3.27
30	86	0.75	986	1039	1091	±6.76	987	1013	1039	±3.43
40	104	0.73	1060	1118	1177	±7.19	1061	1090	1120	±3.76
50	122	0.71	1137	1202	1267	±7.63	1138	1172	1206	±4.1
60	140	0.69	1217	1288	1360	±8.1	1218	1256	1295	±4.45
70	158	0.67	1300	1379	1457	±8.58	1301	1344	1387	±4.83
80	176	0.65	1386	1472	1559	±9.07	1387	1435	1484	±5.21
90	194	0.63	1475	1569	1664	±9.59	1476	1530	1584	±5.623
100	212	0.61	1566	1670	1773	±10.12	1568	1628	1688	±6.04
110	230	0.60	1661	1774	1887	±10.66	1663	1730	1796	±6.47
120	248	0.58	1759	1882	2004	±11.28	1761	1835	1908	±6.92
125	257	0.57	1809	1937	2064	±11.51	1811	1888	1966	±7.15
130	266	0.57	1859	1993	2126	±11.8	1862	1943	2024	±7.38
140	284	0.55	1963	2107	2251	±12.4	1965	2054	2143	±7.87
150	302	0.54	2069	2225	2380	±13.01	2072	2169	2267	±8.36
160	320	0.52	2178	2346	2514	±13.64	2181	2288	2394	±8.87
170	338	0.51	2290	2471	2652	±14.28	2293	2409	2525	±9.4
175	347	0.51	2347	2535	2722	±14.61	2350	2471	2592	±6.67

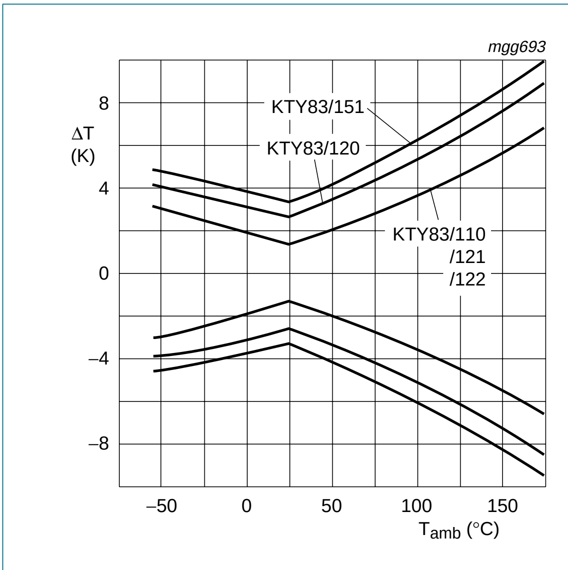
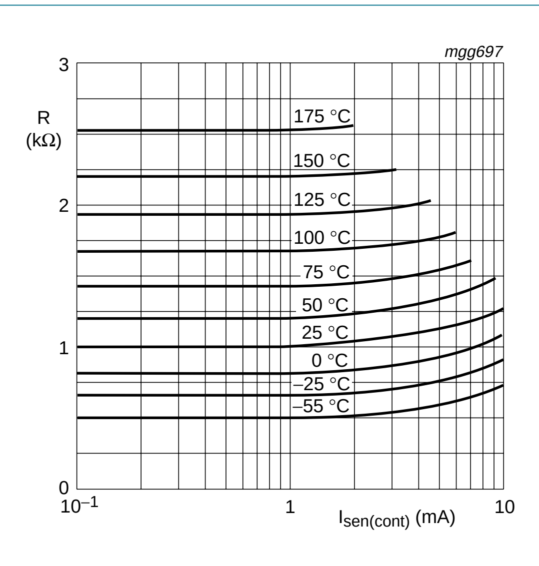


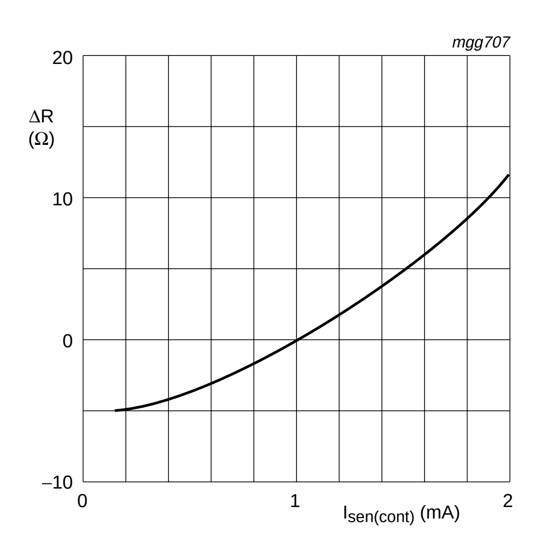
Fig 1. Maximum expected temperature error (ΔT)

Fig 2. Maximum operating current for safe operation



To keep the temperature error low, an operating current of $I_{sen(cont)}$ = 1 mA is recommended for temperatures above 100 °C

Fig 3. Sensor resistance as a function of operating current



T_{amb} = 25 °C

Fig 4. Deviation of sensor resistance as a function of operating current in still liquid

7. Package outline

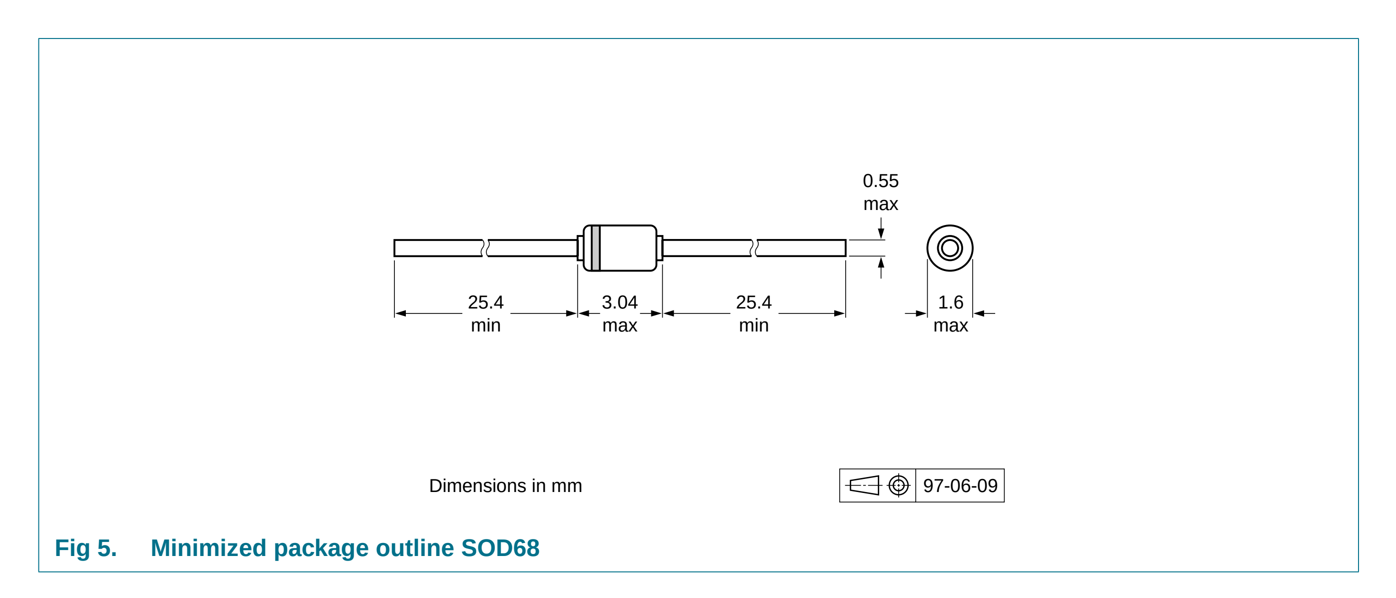


Fig 5. Minimized package outline SOD68

8. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
KTY83_SER_6	20080404	Product data sheet	-	KTY83_SERIES_5
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate.			
KTY83_SERIES_5	20030915	Product specification	-	KTY83-1SERIES_4
KTY83-1SERIES_4	20000825	Product specification	-	KTY83-1SERIES_3
KTY83-1SERIES_3	19980409	Product specification	-	KTY83-1SERIES_2
KTY83-1SERIES_2	19961206	Product specification	-	KTY83-1 series
KTY83-1 series	October 1988	-	-	-

9. Legal information

9.1 Data sheet status

Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

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11. Contents



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